Boulder, Colorado 80309-0019

Final Technical Report: NAG 5-78

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Title: B Supergiants in Open Clusters and Associations

Summary

This is the final report on project NAG5-78, "IUE Observations of B Supergiants in the Large Magellanic Cloud", a collaborative effort between Garmany (U. of Colorado), Sonneborn (Goddard Space Flight Cneter) and Fitzpatrick (Princeton Univ.). We have observed over 90 B supergiants in the Large Magellanic Cloud with the IUE satellite, using the low dispersion mode. These stars were chosen because they resemble the precursor star to SN 1987a, and we saw the need for a data base in the continuing effort to understand why the precursor star was a blue, not a red supergiant. The observations have all been reduced and made into an atlas, and efforts to understand the evolutionary history of stars in this part of the H-R diagram are underway.

Description of the Research Project

The motivation behind this project included not only the explosion of SN 1987a, a formerly blue supergiant in the Large Magellanic Cloud, but also the subsequent discovery of an effect seen in the H-R diagram of LMC stars referred to as a "ledge" (Fitzpatrick and Garmany, 1990). It seems clear that understanding the supernova requires an explanation of this evolutionary significant feature which lies at about the same place as the location of the precursor star. One of us (Fitzpatrick) is involved in obtaining high quality optical spectra of B supergiants in the LMC; this project adds the ultraviolet data for the same set of stars.

The IUE observations were made over two years, and table 1 lists the stars and the particulars of the IUE observations. In addition to 81 stars discussed in the Fitzpatrick and Garmany paper, an additional 10 stars with peculiar characteristics were added to the observing list. All of the spectra have been reduced, and an atlas prepared of both the SWP and LWP images. This will eventually be published; at present we are working on interpretating the results.

The position of the stars observed in this program in the H-R diagram is shown in fig. 1. It is clear that our observations cover both the position of the supernova precursor and also the region of the empirical ledge discussed by Fitzpatrick and Garmany.

JOURNAL OF OBSERVATIONS, BI STARS IN THE LMC

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2:37  1.95    320 s/o     235           21
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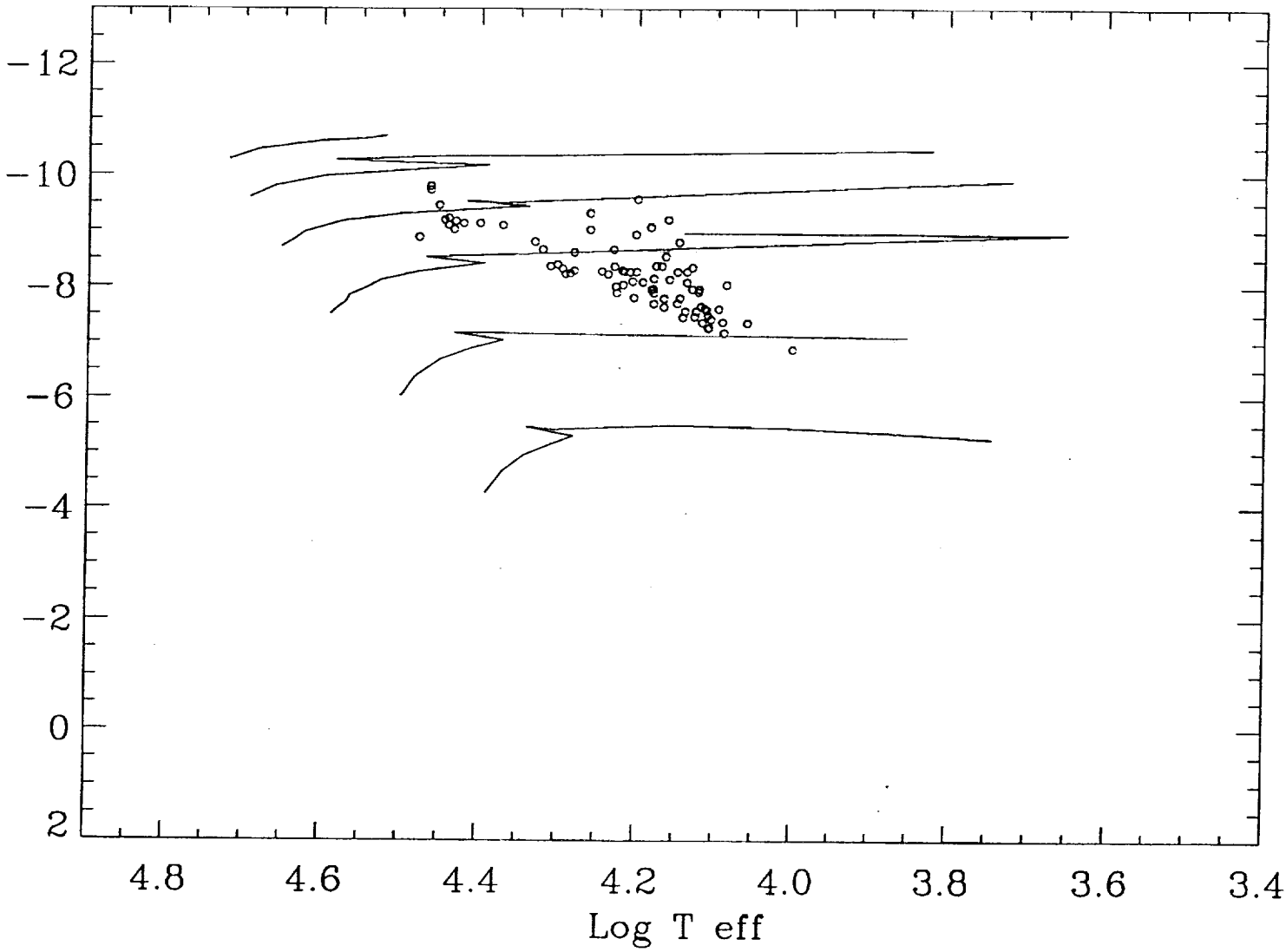
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